

THIS REVIEW IS NOT COMPREHENSIVE. BE SURE TO STUDY YOUR NOTES, HOMEWORK ASSIGNMENTS AND OLD TESTS AS WELL!

1. The distance that a person drives at a constant speed varies directly with the amount of time they have been driving. If, at a particular speed, a person drives 107 miles in two hours, then how far will they drive, at the same speed, in $1\frac{1}{4}$ hours?

$$\frac{\text{miles}}{\text{hour}} \quad \frac{107}{2} = \frac{x}{1.25}$$

$$2x = 133.75$$

$$x = 66.875 \text{ miles}$$

2. Given the function $f(x) = x^2 - 2x + 7$, what is its average rate of change over the interval $3 \leq x \leq 11$?

(1) 8

(3) -5

$$\frac{f(11) - f(3)}{11 - 3} = \frac{106 - 10}{11 - 3} = \frac{96}{8} = 12$$

(2) 12

(4) -7

$$f(11) = 11^2 - 2(11) + 7 = 106$$

$$f(3) = 3^2 - 2(3) + 7 = 10$$

3. Which of the following is the solution set to the inequality $x^2 - 6x - 16 < 0$?

(1) $-2 < x < 8$

(3) $-4 < x < 4$

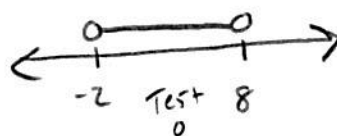
$$(x-8)(x+2)$$

$$x=8 \quad x=-2$$

$$\begin{aligned} 0^2 - 6(0) - 16 &< 0 \\ 0 - 0 - 16 &< 0 \\ -16 &< 0 \\ \text{yes} \end{aligned}$$

(2) $x > 8$

(4) $x < -16$



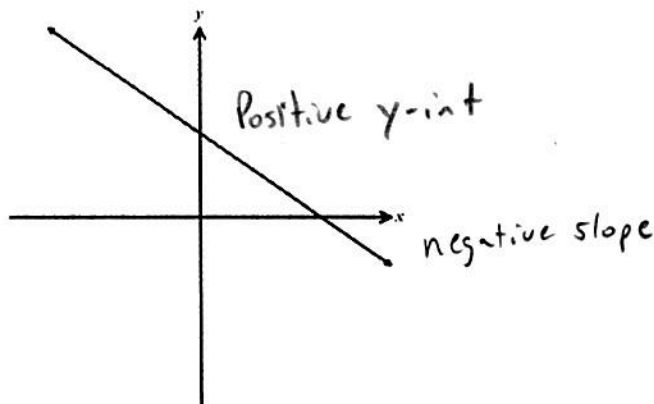
4. Given the line pictured below, which of the following could be its equation?

(1) $y = -\frac{3}{4}x + 8$

(2) $y = 2x - 7$

(3) $y = -\frac{1}{2}x - 4$

(4) $y = \frac{3}{2}x + 1$



5. What is the x -coordinate of the turning point of the parabola $y = 5x^2 + 27x - 3$?

(1) $x = -2.7$

(3) $x = 5.4$

$$x = \frac{-b}{2a}$$

(2) $x = -1.8$

(4) $x = 7.2$

$$x = \frac{-27}{2(5)} = \frac{-27}{10} = -2.7$$

6. Which of the following an equation for the line that is parallel to the line $y = 2x - 9$ and passes through the point $(-1, 5)$?

(1) $y = -14x - 9$

(3) $y = 2x + 7$

Same
Slope

Point slope form

(2) $y = 2x + 5$

(4) $y = -14x + 4$

$$y - 5 = 2(x - (-1))$$

$$y - 5 = 2(x + 1)$$

$$y - 5 = 2x + 2 \rightarrow y = 2x + 7$$

7. Which of the following is the equation of the inverse of the linear function $y = 4x - 2$?

(1) $y = \frac{1}{4}x + \frac{1}{2}$

(3) $y = -4x + 2$

$$x = 4y - 2$$

$$x + 2 = 4y$$

(2) $y = \frac{1}{4}x + 2$

(4) $y = -\frac{1}{4}x + 8$

$$\frac{x}{4} + \frac{2}{4} = y$$

$$\frac{1}{4}x + \frac{1}{2} = y$$

8. The parabola $y = 3x^2 - 24x + 55$ can be written in the form

(1) $y = 3(x - 2)^2 + 2$

(3) $y = 3(x + 2)^2 - 11$

$$y = 3(x^2 - 8x + 16) + 55 - 3(16)$$

48

(2) $y = 3(x - 8)^2 + 55$

(4) $y = 3(x - 4)^2 + 7$

$$\frac{-8}{2} = -4$$

$$(-4)^2 = 16$$

$$y = 3(x - 4)^2 + 7$$

9. The graph of a function and the graph of its inverse always have symmetry across

(1) the x -axis

(3) the line $y = x$

(2) the y -axis

(4) the line $y = -x$

10. A circle whose equation is $x^2 + 4x + y^2 - 10y + 12 = 0$ has a center at

(1) $(-2, 5)$

(3) $(-4, 10)$

(2) $(3, -8)$

(4) $(2, 6)$

$$x^2 + 4x + \boxed{4} + y^2 - 10y + \boxed{25} = -12 + \boxed{4} + \boxed{25}$$

$$(x+2)^2 + (y-5)^2 = 17$$

11. A parabola has a focus at $(0, 10)$ and a directrix of the x -axis. Which of the following is the equation of the parabola?

(1) $y = x^2 + 10$

(3) $y = -\frac{1}{5}x^2 + 5$

(2) $y = \frac{1}{10}x^2 + 5$

(4) $y = \frac{1}{20}x^2 + 5$

Distance to directrix = Distance to Focus

$$y = \sqrt{(x-0)^2 + (y-10)^2}$$

$$y^2 = x^2 + y^2 - 20y + 100$$

$$-y^2 + 20y = -y^2 + 20y$$

$$\frac{20y}{20} = \frac{x^2 + 100}{20}$$

$$y = \frac{1}{20}x^2 + 5$$

12. Which of the following is the value of $\sum_{i=2}^5 (i^2 - 3)$?

(1) 42

(3) 51

(2) 49

(4) 56

$$(2^2 - 3) + (3^2 - 3) + (4^2 - 3) + (5^2 - 3)$$

$$1 + 6 + 13 + 22$$

$$42$$

13. For any value of x , the sum $\sum_{k=0}^3 k(2x-1)$ is equivalent to

(1) $6x - 1$

(3) $12x - 6$

(2) $8x - 2$

(4) $6x - 3$

$$0(2x-1) + 1(2x-1) + 2(2x-1) + 3(2x-1)$$

$$0 + 2x - 1 + 4x - 2 + 6x - 3$$

$$12x - 6$$

14. The series $\frac{1}{3} + \frac{1}{2} + \frac{3}{5} + \frac{2}{3}$ can be represented by

(1) $\sum_{k=1}^4 \frac{1}{k+2}$

(3) $\sum_{k=2}^5 \frac{k-1}{k+3}$

(2) $\sum_{k=0}^4 \frac{k+2}{k+3}$

(4) $\sum_{k=3}^6 \frac{k-2}{k}$

15. Factor the expression below completely.

$$12x^3 + 20x^2 - 3x - 5$$

$$4x^2(3x+5) - 1(3x+5)$$

$$(4x^2-1)(3x+5)$$

$$(2x+1)(2x-1)(3x+5)$$

16. Place the following quadratic function in $y = a(x-h)^2 + k$. Identify the coordinates of its turning point.

$$y = 3x^2 - 12x + 23$$

$$y = 3(x^2 - 4x + \boxed{4}) + 23 - \boxed{12}$$

$$y = 3(x-2)^2 + 11$$

$$TP = (2, 11)$$

17. Write the following in simplest form in terms of x .

$$\sum_{i=2}^4 (ix + 2i) - \sum_{i=0}^2 (2^i x - 3)$$

$$\begin{array}{r} 2x+4 \\ 3x+6 \\ 4x+8 \\ \hline 9x+18 \end{array} - \begin{array}{r} 2^0x-3 \\ 2^1x-3 \\ 2^2x-3 \\ \hline 7x-9 \end{array}$$

$$9x+18 - (7x-9)$$

$$\boxed{2x+27}$$

18. Given the linear graph shown below answer the following questions.

(a) Write the equation of the line in $y = mx + b$ form.

$$b = -6$$

$$m = \frac{3}{2}$$

$$y = \frac{3}{2}x - 6$$

(b) Create a graph of this linear function's inverse on the same set of graph paper.

$$\begin{array}{ll} (0, -6) & (-6, 0) \\ (4, 0) & (0, 4) \\ (8, 6) & (6, 8) \end{array}$$

(c) Determine the equation of the inverse.

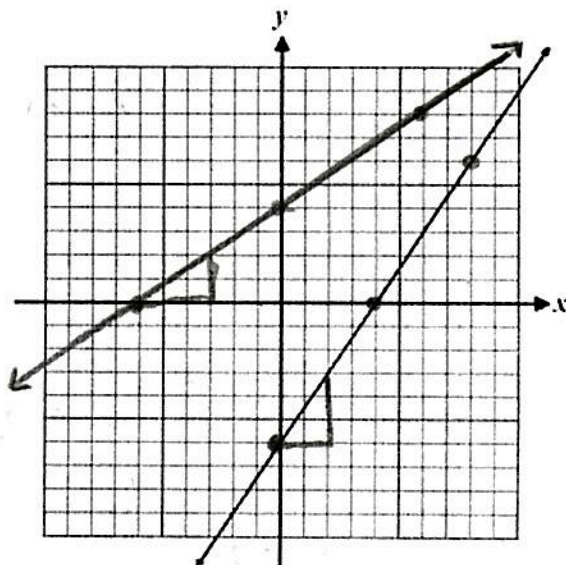
$$y = \frac{3}{2}x - 6$$

$$x = \frac{2}{3}y - 6$$

$$x + 6 = \frac{2}{3}y$$

$$\frac{2}{3}(x+6) = y$$

$$\boxed{y = \frac{2}{3}x + 4}$$



Same slope

19. Selected values of a linear function $f(x)$ are given in the table below. Find the value of k . Explain how you found your answer.

x	-8	-2	4	12	14	18
$f(x)$	-33	-12	9	k	44	58

$$K=37$$

$$\frac{9 - (-12)}{4 - (-2)} = \frac{21}{6}$$

$$\frac{k - 9}{12 - 4} = \frac{21}{6}$$

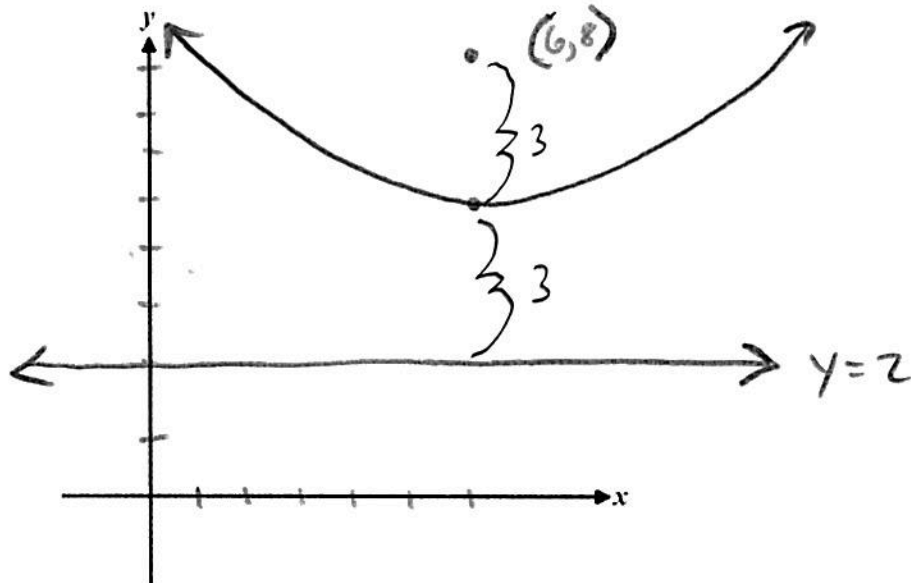
$$\frac{6k - 54 = 168}{+54 \quad +54}$$

$$6k = 222$$

$$k = 37$$

20. A parabola has a focus at $(6, 8)$ and a directrix of $y = 2$.

- (a) Create a rough sketch of the parabola on the axes below. Label the focus and directrix



- (b) What are the coordinates of the vertex of the parabola? Show how you found your answer.

$$(6, 5)$$

- (c) Determine the equation of the parabola using the locus definition of a parabola.

$$\begin{aligned} y - 2 &= \sqrt{(x - 6)^2 + (y - 8)^2} \\ (y - 2)^2 &= (x - 6)^2 + (y - 8)^2 \\ y^2 - 4y + 4 &= x^2 - 12x + 36 + y^2 - 16y + 64 \\ -y^2 + 16y - 4 &\quad -y^2 + 16y - 4 \\ \hline 12y &= x^2 - 12x + 96 \end{aligned}$$

$$\frac{12y}{12} = \frac{x^2}{12} - \frac{12x}{12} + \frac{96}{12}$$

$$y = \frac{1}{12}x^2 - x + 8$$

21. After a recent Arlington High School basketball game, traffic was exiting the parking lot at a constant rate of 28 cars per minute. The parking lot started with 922 cars. How many cars are still in the parking lot after 10 minutes?

$$\frac{28}{1} = \frac{x}{10}$$

$$280 = x$$

$$922 - 280 = \boxed{642}$$

22. Solve the following system of equations algebraically.

$$\begin{array}{rcl} 3(8x - 2y = 5) & \rightarrow & 24x - 6y = 15 \\ 2(-12x + 3y = 7) & & -24x + 6y = 14 \\ \hline & & 0 + 0 = 29 \end{array}$$

$$0 = 29$$



Not True

No Solution

23. Which has the greater average rate of change over the interval $-3 \leq x \leq 4$, the function $g(x) = 3x^2$ or the function $f(x) = 2x + 7$?

$$g(4) = 3(4)^2 = 48$$

$$g(-3) = 3(-3)^2 = 27$$

$$\frac{48 - 27}{4 - (-3)} = \frac{21}{7} = 3$$

$f(x)$ is a line
therefore the rate
of change is always 2

$g(x)$ has a
greater
rate of change

24. Solve the following system of equations algebraically.

$$3x - 5y + 2z = -5$$

$$5x + y + 6z = 33$$

$$-2x + 10y - 3z = 40$$

Use ① and ② eliminate y

$$\begin{array}{r} 3x - 5y + 2z = -5 \\ 5(5x + y + 6z = 33) \rightarrow 25x + 5y + 30z = 165 \\ \hline ④ 28x + 32z = 160 \end{array}$$

Use ① and ③ eliminate y

$$\begin{array}{r} 2(3x - 5y + 2z = -5) \rightarrow 6x - 10y + 4z = -10 \\ -2x + 10y - 3z = 40 \\ \hline ⑤ 4x + z = 30 \end{array}$$

Use ④ and ⑤ eliminate x

$$\begin{array}{r} 28x + 32z = 160 \\ -7(4x + z = 30) \rightarrow -28x - 7z = -210 \\ \hline 25z = -50 \\ \frac{25z}{25} = \frac{-50}{25} \\ z = -2 \end{array}$$

Find x :

$$\begin{array}{r} 4x + (-2) = 30 \\ 4x = 32 \\ \frac{4x}{4} = \frac{32}{4} \\ x = 8 \end{array}$$

Find y :

$$\begin{array}{r} 5(8) + y + 6(-2) = 33 \\ 40 + y - 12 = 33 \\ 28 + y = 33 \\ y = 5 \end{array}$$

$$\boxed{(8, 5, -2)}$$

25. Solve the following system of equations algebraically.

$$x - 2y + 3z = 1$$

$$x + 2y - z = 13$$

$$3x + 2y - 5z = 3$$

Use ① and ② eliminate y

$$\begin{array}{r} x - 2y + 3z = 1 \\ ④ x + 2y - z = 13 \\ \hline ④ 2x + 2z = 14 \end{array}$$

Use ① and ③ eliminate y

$$\begin{array}{r} x - 2y + 3z = 1 \\ ④ 3x + 2y - 5z = 3 \\ \hline ⑤ 4x - 2z = 4 \end{array}$$

Use ④ and ⑤ eliminate z

$$\begin{array}{r} 2x + 2z = 14 \\ ④ 4x - 2z = 4 \\ \hline \frac{6x}{6} = \frac{18}{6} \\ x = 3 \end{array}$$

Find z :

$$\begin{array}{r} 2(3) + 2z = 14 \\ 6 + 2z = 14 \\ 2z = 8 \\ z = 4 \end{array}$$

$$\boxed{(3, 7, 4)}$$

Find y :

$$\begin{array}{r} (3) - 2y + 3(4) = 1 \\ 3 - 2y + 12 = 1 \\ 15 - 2y = 1 \\ -15 \quad -15 \\ \hline -2y = -14 \\ \frac{-2y}{-2} = \frac{-14}{-2} \\ y = 7 \end{array}$$

